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Statistics Needed by Readers

By R. W. TYLER

Most courses in educational statistics are designed to teach the students how to compute various statistical measures such as the mean, median, standard deviation, and coefficient of correlation. Notwithstanding this fact, many persons enroll in these courses who are not expecting to make statistical computations but wish to learn to read and to interpret statistical references. Professor Holzinger, of the University of Chicago, last summer took a poll of his large class in statistical methods to determine what use the students expected to make of the course. In this group of more than one hundred college teachers, school superintendents, principals, and teachers, only about ten per cent expected to make any statistical computations while approximately ninety per cent of the class wanted to learn to interpret correctly the statistical references appearing in current educational literature. Similar results were obtained when the writer of this paper asked this question of the students at the University of North Carolina.

What sort of training in statistics is necessary in learning to read educational literature intelligently? Does not the typical course in computational methods adequately serve the needs of readers? There are two types of evidence available to indicate that the typical course in computational statistics does not train critical readers of statistical material. The first evidence is the nature of many of the textbooks widely used in such courses. An analysis of three of these books reveals the fact that only twenty-two pages in these three books are devoted to discussions of the conditions under which a given statistical measure is appropriately used. Only seven exercises in the three books require the student to evaluate critically the sug-

gested uses of statistical measures. Little emphasis is given in any of these textbooks to methods for interpreting intelligently the statistical measures used in educational investigations.

Another evidence of the inadequacy of computational courses for training readers may be obtained by making a survey of those who have taken such courses. In the last three years, at two different institutions in connection with a course in educational measurements, the writer assigned an exercise in interpretation to the students who had had work in statistics. The exercise referred to several articles which had recently appeared in educational publications. All of these articles used such statistical measures as the mean, correlation coefficient, standard deviation, and probable error. The students were asked to read each article, then to write down the assumptions necessary to justify the use of these statistical measures, and finally to indicate which measures were probably not the valid ones to use in connection with the investigation described in the article. Of the 142 students, only 17 were able to distinguish measures properly used from those which were inappropriate. Only 63 students were able to identify one or more assumptions involved in the use of these measures. Graduate students themselves recognize their inability to read such articles and evaluate them critically as evidenced by interviews with candidates for higher degrees.

The failure of computational courses to train intelligent readers of educational publications is not necessarily to be attributed to poor teaching or to poor organization of the computational courses. In the time available in such a course there seems to be little enough opportunity for the necessary practice in computation. It requires time to compute a coefficient of correlation, and sufficient practice to develop fluency in computing this measure demands a considerable portion of the course, and so it is with other measures. The development of computative skill is in itself a time-consuming task, leaving little or no opportunity for a consideration of the uses to which these measures may be put. Teaching students to evaluate critically the uses of statistical measures made by writers of current articles is also time-consuming, for it requires a great deal of reading and of analysis. It is not surprising, then, that the two types of objectives are rarely attained in the same class.

THE inadequacy of typical computational courses for the training of intelligent readers suggests the desirability of constructing a course in educational statistics designed especially for the readers of educational publications. At least two preliminary steps in this direction have been made in the past few years. Edgerton analyzed five widely read educational periodicals and found sixteen statistical terms which made up the bulk of the statistical concepts required by readers of these publications.[1] Whitney has prepared a brief volume entitled *Statistics for Beginners in Education* in which he explains in an elementary fashion the statistical terms which appear most frequently in current educational publications.

The identification and the definition of common statistical terms are helpful preliminaries in developing courses for readers. However, the intelligent and critical interpretation of articles employing statistics requires an understanding of the uses to which statistical measures may appropriately be put. Many false conclusions are reached by writers who have used statistical measures under conditions in which they are not appropriate. If readers are to interpret writings wisely, they must be able to distinguish conclusions reached by use of appropriate measures from conclusions reached by the use of measures not applicable to the conditions discussed. This is a fundamental type of training necessary for readers of educational publications. To this end the course must go beyond the mere definition of terms.

By what techniques can one construct a course designed to teach readers to make this critical analysis of educational literature? It is the purpose of this paper to describe the method followed by the writer in deriving materials for such a course.

THE raw materials for this course will consist of three types. In the first place, the reader will encounter statistical measures which are used by the writers of educational publications. He will also find that these measures are used in answering specific educational problems. For example, the measure, coefficient of correlation, is used in a certain article to answer the question, "To what extent are failures in history due to reading difficulties?" Moreover, certain assumptions must be

[1] Edgerton, Harold A. "What Acquaintance with Statistics Is Necessary?" *Educational Research Bulletin*, V (January 6, 1926), pp. 14-16.

made in order to justify the use of this statistical measure in solving the specific educational problem. Thus, in the illustration just given, before the use of the correlation coefficient could be justified, it is necessary to assume that any correlation which may exist between ability in history as measured by history tests and ability in reading as measured by reading tests shows that failure in history is attributable to deficiencies in reading ability. Obviously, these assumptions must be identified by the reader since the assumptions are a basis upon which the statistical soundness of the article may be judged. The raw materials for the course, then, will consist of the statistical terms used in educational publications, the educational problems in connection with which the statistical measures are used, and the assumptions necessary to justify these uses of the statistical measures.

The first step in our collection of raw material was to select the educational publications to be analyzed. On the basis of the study by Kelly and Whitney,[2] LaPoe's study,[3] and the unpublished study of Lantz, the periodicals selected for analysis were *School Review, Elementary School Journal, Educational Research Bulletin, Journal of Educational Research, Journal of Educational Psychology, Teachers College Record, School and Society, Educational Administration and Supervision,* and *American School Board Journal.* The last complete volume of each of these publications was analyzed. This was either the 1929 volume or the 1928-29 volume.

THE indexes of the textbooks in statistics by Garrett, Holzinger, Kelley, Rugg, and Yule were consulted, and from them a list of statistical measures was compiled. This list, containing such measures as mean, median, standard deviation, and validity was used as a guide by a reader who went through each volume of the periodicals just selected. Whenever the reader encountered one of these statistical measures the place was marked, then in conference with the writer a statement was made of the specific problem in connection with which the statistical measure was used. Each problem was typed upon a card, 3 by 5 inches, together with the statistical measure used

[2] Kelly, Lowell, and Whitney, Frederick L. "Educational Magazines Read by Five Hundred Elementary School Principals and Classroom Teachers," *Elementary School Journal,* XXIX (November, 1928), pp. 176-80.

[3] LaPoe, James L. "The Senior High-School Principal's Professional Magazines," *Educational Research Bulletin,* VI (September 14, 1927), pp. 259-61.

in answering the problem. To illustrate, the data from three cards are recorded here:

Card I—
Problem:
How does the achievement in English grammar of ninth-grade pupils compare with that of eleventh-grade pupils?
Measure:
Mean

Card II—
Problem:
How valuable is the Iowa test on English essentials?
Measure:
Validity

Card III—
Problem:
To what degree is intelligence rating due to home environment?
Measure:
Partial correlation coefficient

The measures which appeared on the cards are shown in the open table which follows, together with the number of educational problems in which each measure was used.

Statistical Measure	Number of Problems	Statistical Measure	Number of Problems
Coefficient of correlation	101	Multiple correlation coefficient	6
Average	80	Regression equation	4
Distribution	76	Semi-interquartile range	4
Median	71	Correlation ratio	3
Range	37	Mode	3
Mean	32	Overlapping	3
Probable error	23	Quintile	3
Standard deviation	21	Standard error	3
Reliability	20	Per cent of gain	2
Validity	15	Quartile deviation	2
Quartile	13	Coefficient of variability	1
Sampling	12	Correction for attenuation	1
Norm	10	Rho	1
Partial correlation coefficient	10		
Percentile	7		

Thus, the first line of the table shows that the measure, coefficient of correlation, was used in connection with 101 specific educational problems. Each entry in the table is to be interpreted in the same fashion.

AFTER the cards had been typed, they were organized by classifying them first with reference to the statistical measures used, then subclassifying with reference to the type of

educational problems involved. For example, there was one large unit on the coefficient of correlation. A typical subtopic in this unit included those problems involving the prediction of school success. To illustrate this grouping, all of the typical problems classified under the coefficient of correlation are listed here in order of their frequencies:

1. To predict school success
2. To predict occupational success
3. To predict test scores
4. To determine the factors producing a given trait
5. To determine the reliability of tests
6. To determine the reliability of ratings
7. To distinguish inherited traits from acquired traits
8. To determine the validity of tests
9. To determine the validity of ratings
10. To determine the interrelationship of personal traits
11. To determine the relationship between environmental factors and personal traits
12. To determine quantitative measures which may be used to evaluate qualitative characteristics
13. To determine the validity of personal judgments
14. To determine the reliability of personal judgments
15. To determine the factors which produce given environmental conditions
16. To evaluate educational objectives
17. To determine the interrelationship of environmental conditions
18. To evaluate the internal consistency of tests
19. To select the most useful tests by comparing the scores of one test with another
20. To determine the reliability of school grades
21. To determine the validity of school grades
22. To determine the persistence of traits
23. To determine the persistence of individual differences
24. To evaluate the internal consistency of rating scales
25. To determine quantitative measures which may be used as indices of measures more difficult to obtain
26. To determine the persistence of environmental factors
27. To evaluate hypotheses of causal relationships
28. To determine the amount of one trait, produced by another trait

These problems will serve as the subtopics of the unit on coefficient of correlation. Obviously, they are types under which many specific problems may be grouped. For example, the typical problem, "To predict school success," includes such specific problems as: to predict success in high-school French by means of grammar-school grades, to predict success in college from intelligence-test scores, to predict history grades from reading-test scores.

AFTER the cards had been classified, the writer began an analysis of the assumptions necessary to justify the use of the given statistical measure in answering the problem appearing on the card. A considerable fraction of these assumptions

are not valid under the conditions in the articles. For example, one common assumption found is that a partial coefficient of correlation will show the amount of one variable which is caused by another variable. Another common assumption is that the computation of the probable error gives a measure of the total quantity to be allowed for both unreliability and invalidity. Thus, one writer states: "The probable error of his reading score is 2 points. Hence, we can be certain that we have a valid measure of a student's true reading ability within 2 points." All of these are examples of invalid assumptions. The astounding fact is that approximately one-third of all the assumptions identified in this study are invalid.

These assumptions, both valid and invalid, constitute useful raw material for the course since a very significant phase of a reader's training is to learn to evaluate the soundness of the writer's conclusions. Too often, the writer's conclusions are taken at their face value when they have been reached by unjustifiable assumptions. An intelligent reader must be able to identify those assumptions which are valid in order to evaluate the significance of the findings presented in the article.

The primary differences between the raw materials for this course and the typical course in educational statistics is in the collection of educational problems in connection with which statistical measures have been used and the collection of assumptions, both valid and invalid, which are involved in current articles. The study has not yet progressed beyond this classification and analysis of the raw materials. It is planned to organize the course so that in connection with each unit the student will read articles which use the statistical measure in answering each of the important type problems. The student will be given practice in identifying the assumptions involved in using the statistical measure in connection with each type problem. The training will be directed toward learning to distinguish those assumptions which are justifiable.

Obviously, this training in making intelligent evaluations of articles using statistical measures, is different from training in computation. Possibly it is more difficult to learn than to learn to compute. However, it is the writer's belief that the necessity for intelligent interpretation of statistical publications justifies the experiment which this course involves.

The Twenty-ninth Yearbook

By W. J. OSBURN

THE *Twenty-ninth Yearbook of the National Society for the Study of Education* is a volume of more than seven hundred pages. The reading of so great an amount of material is quite an undertaking for the busy school man and woman. Therefore, it has seemed desirable to present this digest and review of the total contribution. The discussion will be classified under two main divisions, the first relating to the outstanding contributions and the second the defects.

The *Twenty-ninth Yearbook* is the report of the Committee on Arithmetic appointed by the Society, and the discussion falls into two parts, "Some Aspects of Modern Thought on Arithmetic," and "Research in Arithmetic." The more outstanding contributions in the opinion of the writer are first presented in outline form for the convenience of the reader. The topics are listed in order of their appearance in the book with no indication of relative merit. The most significant topics of the *Yearbook* with the pages devoted to each are:

	Pages
1. Emphasis upon the fact that the child's future is a part of him	1
2. The social value of arithmetic	9-62
3. The need for a study of proportion	45
4. The limitations of the Social Utility Theory	42-43, 79-80, 449-51
5. The need for a study of all three cases of percentage	45-47
6. When should regular number work begin	48-51
7. The capital importance of problem-saving	56-60, 357-60, 370-73, 399-408
8. The history of the course of study in arithmetic	66-73, 86-107
9. Suggestions concerning the course of study in primary numbers	112-17
10. Number performance at various mental levels	122-24, 643-70
11. Interference factors	153-56
12. The danger of overly terse presentation	171
13. The difference between survey and diagnostic tests	288-93
14. The technique and value of individual diagnosis	298-309
15. The use of remedial procedures	309-16
16. Professionalized subject-matter in arithmetic	352-408
17. Techniques of research	419-43
18. The defects of incidental teaching	455
19. The number abilities of children when they enter Grade I	473-75, 508-509
20. The value of mixed drills	549
21. The relative difficulty of the one hundred multiplication combinations	555-57
22. Type errors in multiplication combinations	561-63, 567-68
23. Errors in percentage	628, 630-36

The items in the foregoing table are by no means all of the good things that the *Yearbook* contains, but they are sufficient

to show the importance of the total contribution. The book as a whole is based upon a sound and scholarly philosophy of education. Many portions of it will exert a profound influence upon educational practice. As a result of this publication, we shall have saner ideas concerning the social values of arithmetic, and our notions of grade-placement will be greatly clarified. The committee deserves much credit for the splendid job that it has done.

SINCE the *Yearbook* is destined to be used so widely, it becomes doubly important to call attention to certain shortcomings which it contains. A number of these defects with page references are listed here:

	Pages
1. Failure to give complete references	380, 445-69
2. Lack of systematic treatment	1-2, 65-66
3. Vague treatment	183-224, 236-37, 309, 614, 619
4. Inaccurate statistical treatment	163, 189, 191
5. Failure to discuss reliability	569-87, 589-99
6. Failure to discuss validity	601-10

The number of items is small, but each of the defects possesses real significance, so that it is worth while to discuss them in some detail. Incomplete reference is a real defect in several chapters. Usually the author of a quotation is named, sometimes the title of the book or article in which it appeared is given, but there is a widespread tendency to omit the name of the publisher or the name of the publication to which reference is made. In the third chapter of Part II we read that detailed research studies in arithmetic are now in print and may be procured easily, but no information is given as to where to get them. Again and again we read that Judd, Wilson, Woody, Knight, and others have done so and so, or made a study of such and such a nature, but there is no complete citation. In a few cases, research data are quoted with no sort of reference or credit at all. This kind of oversight is not in agreement with the best tradition among research publications. It is particularly unsatisfactory to the reader who wishes to pursue some special statement back to its source.

On page 411, we are told that "Part I consists in a systematic treatment of the general field of arithmetic. Part II is devoted to research related to this subject." The reader of this quotation will get the idea that the treatment in Part I is

exhaustive in spite of the fact that its title is "*Some* Aspects of Modern Thought on Arithmetic." The two sentences on page 411 have got in by accident during the rush of preparing the material. To obviate possible misinterpretation of them, it is well to raise several questions about the material either omitted from the *Yearbook* as a whole or else given only minor treatment.

FIRST, the *Yearbook* is brief in its discussion of problem-solving. One member of the committee reports that problems and problem-solving receive but partial discussion because "lack of rigorous data permits no thorough and penetrating discussion at present."[1] This statement simply ignores the contributions of Clapp and Hydle, Merton and Banting, and fifty-three others listed by Hanna in his recent study.[2] Two epoch-making studies that have recently been completed at Cleveland, Ohio, and Wheeling, West Virginia, could have been made available upon request. So far as "rigorous data" are concerned, any of these fifty-seven studies would have been strong contenders when compared with some of the material that the committee did publish.

Almost every wayside school is struggling in an attempt to give arithmetical instruction on, at least, three levels. If we have learned any one thing from the testing movement through which we have just passed, it is the fact that children differ markedly. It is rather easy to defend the thesis that the differentiation of instruction is the greatest problem that we now face in school administration and supervision. At Ambridge, Pennsylvania, an experiment in the differentiation of instruction in arithmetic has been going on for five years. Differentiation is a question of major importance to which the *Yearbook* accords only minor consideration.

[1] *Twenty-ninth Yearbook of the National Society for the Study of Education.* Report of the Society's Committee on Arithmetic. Bloomington, Illinois: Public School Publishing Company, 1930. p. 1.

[2] Hydle, L. L., and Clapp, Frank L. *Elements of Difficulty in the Interpretation of Concrete Problems in Arithmetic.* Madison, Wisconsin: University of Wisconsin, 1927. 84 pp. (Bureau of Educational Research Bulletin, No. 9)

Merton, Elda L., and Banting, G. O. "Remedial Work in Arithmetic." *Second Yearbook of the Department of Elementary School Principals.* Washington, D. C.: National Education Association, 1923. pp. 395-429.

Hanna, Paul R. *Arithmetic Problem Solving: A Study of the Relative Effectiveness of Three Methods of Problem Solving.* New York: Teachers College, Columbia University, 1929. 68 pp.

One looks in vain for an adequate treatment of the informational side of arithmetic and for help in connection with the vexatious problem of what arithmetic to teach in Grades VII and VIII. Finally, there is no mention at all of the arithmetic needed in the high school. The reductionists have been busily engaged in wrecking the foundation of high-school mathematics. One of them has said recently that 85 per cent of this foundation is useless. At the same time perplexed superintendents, principals, and teachers are wondering why pupils in algebraic courses are unable to deal with factoring, least common multiple, greatest common divisor, square root, and a number of other arithmetical processes that are necessary in algebra. The high-school teacher of geometry wonders why the pupils are so "thick-headed" in dealing with similar triangles, the teacher of physics does not understand why Pascal's Law gives so much trouble, and the teacher of chemistry does not know why his pupils cannot balance equations. None of these teachers realizes that proportion has nearly vanished from arithmetic, thanks to the reductionists. The *Yearbook* ignores the whole question in spite of the fact that Rugg and Clark showed ten years ago that algebra pupils have more trouble with arithmetic than they do with algebra.[3]

IN ONE large section the *Yearbook* is unnecessarily vague and abstruse.[4] The section relates to the instructional material in eight or ten current textbooks. We are warned that instructional material is to be distinguished carefully from drill and problem material and apparently from review. With this distinction in mind, the author proceeds to study eight or ten current textbooks in arithmetic and concludes that all of them are mostly wrong or inadequate. Such conclusions are not warranted because the meaning of the term "instructional material" is not clear. A careful reading of this section leaves one in great perplexity. Is "instructional material" the same as the content provided for purposes of reteaching? Does the identification of elements constitute instructional material? Just how does instructional material differ from review, drill, and problem-solving? Are we to understand that there are

[3] Rugg, H. O., and Clark, J. R. *Scientific Method in the Reconstruction of Ninth-Grade Mathematics.* Chicago: University of Chicago Press, 1918. 189 pp. (Supplementary Educational Monographs, No. 7)

[4] Pp. 183-224.

no opportunities for instruction or learning in solving a problem? May there not be "an integration of facts and procedures" in review exercises? Is not drill material of educational value? Just what contribution does instructional material offer which is separate and distinct from the values ordinarily received from drill, problem-solving, and review exercises? None of these questions are answered clearly, and the use of so large a portion of the *Yearbook* in the discussion of the vague topic which the author designates as instructional material seems entirely unwarranted.

If the meaning of instructional material were clear, other questions would still remain. The reader might ask why it is necessary to repeat instructional material at all in a textbook. How frequently should it be repeated and for how long a time? The author apparently recommends that each item of instructional material should be repeated continuously throughout the grades of the elementary school. If this is true, should not the items also be retaught in the junior high school, the senior high school, the college, and even the graduate school? Would it be entirely certain that the members of the Arithmetic Committee are safe from the needs of reteaching?

THIRTY-THREE pages of the *Yearbook* are devoted to the reteaching of the fundamental combinations in the addition of integers. It is recommended that this reteaching should continue throughout the eight grades of the elementary school, but Buckingham and MacLatchy have shown that half of the children can solve half of these combinations before they enter school at all.[5] Why, then, should so much attention be given to instructional material and reteaching? What is the idea of expecting a textbook to present even once an instructional situation which the majority of the children already know? Is it not possible that an injustice has been done in comparing these eight textbooks upon such a basis?

Furthermore, if all of the 1,200 fundamental combinations, and all of the 23 steps in percentage, and all of the 200 fraction skills, and all of the hundreds of definitions and facts are to be retaught again and again, will not the needs of reteaching soon come to occupy the entire time of the school? Will there be time to teach anything new in Grades VII and VIII, or shall

[5] P. 506.

those grades be entirely taken up with the reteaching of primary and intermediate arithmetic? If such is the case, what a paradise for morons that will be! And also, what an unspeakable crime against the bright child.

When a fog arises in one locality it is quite likely to spread into adjoining regions. One writer in the *Yearbook* has raised thick fog with his discussion of instructional material and the fog spreads so as to obscure the meaning and function of drill. We read:

1. In this study it is held that a number combination is taught (in contrast to drilled upon) if its sum is given or if a teaching situation is provided where it is reasonable to assume that the child will find its sum from a study of the material in question. (p. 188)
2. It can easily be seen that the keeping of instruction separate from drill and problem work sets up an arbitrary distinction that is unreal. (p. 204)
3. For discussion here, two major purposes of drill may be mentioned: (a) drill to build a skill, and (b) drill to maintain a skill. (p. 234)
4. That drill, as such, contributes to skill is assumed in this discussion. (p. 225)
5. They (the really important issues of effective learning) concern such matters as . . . clear, well-understood ideas of a process before drilling upon it. (p. 266)

In the last quotation it appears that every item must be thoroughly taught and learned before any drill is provided. But third and fourth quotations clearly declare that drill has a part in learning. The second tells us that the distinction between instruction and drill is unreal. If this is true, why, in the name of common sense, is it necessary to raise such an issue on the *need* of the same separation on pages 183 to 224?

Thus the fog is first raised. On page 309, another author says, "One of the most pernicious causes of incorrect habits of work in arithmetic is the application of drill exercises on processes which the pupil has not yet learned to do correctly." Now the question arises: If the pupil has learned to do the exercises correctly, why drill at all? Apparently, we should not drill before the pupil reaches perfection, and after that we do not need to. So it comes about that all drill is either wrong or useless. Thus the fog spreads from instructional material to drill, and from one author to another.

THE value of the *Yearbook* would have been enhanced if certain of the statistical material had been treated more rigorously. On page 189 there is a table which shows that instruc-

tional material in Grade III scores zero for 56 addition facts in all eight arithmetics. This zero is the median for all the books. Now the only way to arrive at a zero median under such circumstances is to find that each of five textbooks is represented by a zero. That is, all five books have failed to teach all of 56 combinations even once. This is simply incredible; something is certainly wrong.

On page 191 we have another table which shows that the average amount of instruction material in Grade III relating to the 19 zero combinations in addition is zero. Again we are to believe that none of the eight textbooks taught the zero combination at all. Surely the author does not mean what he says. On pages 197 and 199 we have tables in which we are told that an average of zero means "less than one." In this case, an average of zero might mean that three of the eight books did have instructional material on the particular items.

Table III on page 163 is open to more serious criticism. The table is given as a reprint of a similar one in the *Fourth Yearbook of the National Department of Superintendence*, but this is true only in part. The frequencies are different in the two tables, and also the legend which explains the nature of the difficulties. In this *Yearbook*, D means there is quotient difficulty when the first digit of the divisor is used as the trial divisor. In the *Fourth Yearbook* this item is indicated by ND. In this *Yearbook*, ND means there is no quotient difficulty when the first digit of the divisor is used as the trial divisor, while in the table on the *Fourth Yearbook* the corresponding legend is D. In similar manner NI in the table in the *Twenty-ninth Yearbook* means the same as I in the *Fourth Yearbook*, and I means the same as was previously indicated by NI. Furthermore, several of the frequencies are different. The writer of this review has gathered data on this same problem and has obtained frequencies that are markedly different from each of the foregoing tables. Table I summarizes the discrepancies from all three sources. Here ND means no difficulty in estimating the quotient by using the first digit in the divisor, and D means that there is such difficulty. NI means no difficulty arises when the left-hand digit in the division is increased by 1. I means that such an increase causes difficulty.

The discrepancy in the totals is partly due to the failure of the workers in both yearbooks to count in 4,905 cases where the

quotients are zero[6] and the 4,500 exercises in which a two-figure divisor ends with zero. But this is not all of the story. The 10,970 cases in the column in the extreme right contain the 7,020 cases in which the divisor ends in 1, 2, 3, 4, or 5 and gives a non-apparent quotient as in $209 \div 21$. These cases are not mentioned in either yearbook.

The data in this connection are perfectly objective. One set of frequencies and only one can be correct. The matter is of importance as a means of evaluating the increase-by-one rule. This ancient *ignis fatuus* has been misleading us since 1850, at

TABLE I

NATURE AND FREQUENCY OF THE DIFFICULTIES IN LONG DIVISION

Nature of Difficulties	Frequency in *Fourth Yearbook*	Frequency in *Twenty-ninth Yearbook*	Frequency According to Osburn
(1)	(2)	(3)	(4)
ND–I	24,570	24,439	29,805
D–NI	14,121	14,202	8,275
D–I	1,404	1,454	10,970
Total	40,095	40,095	49,050

least. Nevertheless, it has recently been unduly readvertised as the long-sought panacea for long division. Some ambitious young investigator ought to ascertain the correct frequencies for Table I, and thereby end the use of the increase-by-one rule as a reputable method in long division.

A final table that looks doubtful is Table II on page 614. Here on the "final tests," the scores run up above 400. Throughout the study, the unit has been the example. Evidently the final tests (the word *tests* is plural) must have been composed of more than 400 examples. We are not told how many of these "final tests" there were, but certainly there were several. The mean (there is only one) for the control group is 273.8 and for the experimental group, 285.14. The standard deviation for the control group is 57.68 and for the experimental group, 56.48. The difference between the two means is 11.34 or approximately one-fifth of each *SD*.

In Table IV, one page 618, the same author, speaking of the same data, divides the control and experimental groups into

[6] Zero quotients are notoriously troublesome in long division. They should have been counted.

twenty divisions. Then he counts the gain of each division of each group in terms of *SD*'s. The sum of these twenty *SD*'s for the experimental group is 4.081 while the corresponding sum of the *SD*'s for the control group is .783. From this the author concludes that "few faiths in education are based on more convincing data than those presented in Table IV." Such juggling of statistics seems unpardonable. Whatever "faith" can be placed in the results of this experiment must be based on the averages of each of these twenty groups, not on the sums. The significant figures here are not 4.081 and .783 but one-twentieth of each of these numbers, .24 and .039. The *SD* gain of the experimental group .24 agrees closely with the gain of one-fifth *SD* shown in Table II. If one-fifth *SD* is correct, it does not constitute an encouraging peg on which to hang one's educational faith.

On pages 236 and 237 there is a discussion of tests of progress that raises some interesting questions. The problem under discussion is one of standardization. In standardizing such tests one may standardize the subject-matter of arithmetic as a whole. Then the average pupil in Grade IV should score, say, 7; and the average pupil in Grade V should score, say, 8.5. In general the pupils' scores should increase as they progress through the grades. According to the other method, a child in each grade is ranked according to his relative position with reference to the central tendency of his grade. Thus a child in each grade may score 7, but each of these 7's actually represents a different level of attainment. The point at issue centers in the question of the nature of progress. A child usually progresses from year to year because of his growth in understanding. He may also progress relative to the other pupils in his grade. Each of these factors must be taken into account if accuracy is to be attained in the measurement of progress. Those who base their scores of progress on the grade average are failing to take mental growth into account.

THE fifth chapter of Part I is an excellent discussion of "Testing, Diagnosis, and Remedial Work in Arithmetic," but for some reason, no mention is made of the inventory test. The chapter raises two questions in statistics that need special mention. We read: "The reliability of the percentage of error and success on a given example will depend first on how large

that percentage is, and second on how many cases there are in the group from which the percentage is computed."[7] The first half of this statement is misleading. Reliability decreases as the percentages of success and failure each approach 50. The most unreliable condition possible is the case in which the percentage of errors and the percentage of successes are equal.

It seems possible, also, that reliability for both group and individual diagnoses is often influenced by the nature of the errors. For example, in the exercise $9 - 6\frac{3}{4} = ?$ the errors are not distributed according to the "curve of error." Practically all of them are the same, namely $3\frac{3}{4}$. Surely the presence of such typical errors affects the question of reliability.

In Part II there are several chapters that need refinement in statistical technique. The chapter on the "Measurement of Transfer in the Learning of Number Combinations" fails to consider the question of reliability. Statements concerning high transfer among pupils of low intelligence are based upon results obtained from only nine such pupils. In like manner the chapter on "Improving Ability to Reason in Arithmetic" fails to mention the question of reliability. In addition to this, no information is given concerning the character of the practice material. These two factors detract greatly from the usefulness of this chapter. The chapter on "A Test in Arithmetic for Measuring General Ability" needs defense on both reliability and validity.

The good things in the *Yearbook* are so numerous and so evident that they need only to be pointed out in a review. The defects are much fewer in number, but considerable space has been required in explaining them. In spite of the amount of space devoted to the defects, the reviewer will guarantee that the *Yearbook* is "seven-eighths first class." No one should ignore or in any wise disparage the book because of the doubtful eighth. All of us may well be profoundly thankful if our writings and teachings are sound and free from fog as much as seven-eighths of the time. We should likewise be thankful for the valuable, extensive, and substantial contributions which the *Yearbook* contains. These contributions will mark a distinct advance in our thought and practice.

[7] P. 284.

COMMENT

A Plea for Scientists in Education

THE development of a science of education demands educational scientists. Those who engage in education as a science must possess the personal qualities of a scientist as well as being familiar with the tools and techniques of educational science.

Biographies of scientists such as the *Life of Pasteur* give inspiring glimpses of the enduring personal traits of these men as much outstanding as their technical skill. Pre-eminent among these traits are devotion to exact truth and willingness to revise beliefs, hypotheses, or theories when these appear incompatible with the facts. Newton, after years of painstaking work, withheld the publication of his universal law of gravitation when he found the law did not fit the planetary measurements of that day. Later when more exact measurements were available his hypothesis was found to be in accord with these new measures, but not until then would he publish his theory.

Einstein's recent hypothesis of relativity was opposed to the previous beliefs of all physical scientists. Nevertheless, these scientists were willing to change their beliefs without emotional outbursts when their hypotheses were found to be incompatible with the facts.

In educational meetings and in educational publications pronouncements are often made by men who may be skillful in the techniques of science but are notably lacking in the personal traits of great scientists. Too commonly, their addresses and articles deal in extreme, inexact statements or are colored by an emotional unwillingness to consider the facts of the case. Such statements as "The entire college curriculum is of no value," "Science has proved that students who have had no school courses in history know as much history as those who take history," "The attempt to teach pupils in classes has been found to have no educational value" are examples of recently published extreme statements which are certainly lacking in exact truth. Such pronouncements by men who are engaged in education cause others to place little confidence in the truth of educational discoveries.

The improvement of education as a science is not to be brought about by startling statements. Rather must we develop educational scientists devoted to exact truth and willing to change their beliefs when these are incompatible with the facts. These men, by the acquisition of scientific techniques and through the encouragement of experimentation, must patiently find the accurate facts which can be used to control and promote effective education. Educational research can reach its greatest possibilities only through research workers who are scientists.

R. W. TYLER

Research Assistant to be Chosen

THE research assistantship in the Accomplishment Tests Division of the Bureau of Educational Research, Ohio State University, will be vacant September 1. The work of this division is to co-operate in constructing accomplishment tests and in interpreting test results for schools and for various departments of the University. The division thus provides an opportunity for training persons who are interested in this field of work and wish to engage in research.

The applicant should have had training in measurements and statistics and should hold the Master's degree. He should expect to remain in the Bureau two years at which time he should have completed his requirements for the Ph.D. degree.

The assistant is permitted to carry two academic years' work toward the Ph.D. in two calendar years, utilizing the remainder of his time in assisting in projects of the Bureau. He is exempt from University fees and receives a stipend of twelve hundred dollars per year. In addition, he normally finds that his dissertation problem in connection with Bureau projects thereby materially lessens the usual cost of the investigation. The EDUCATIONAL RESEARCH BULLETIN provides a channel through which he may publish worth-while reports of his work. All of these opportunities make the position an attractive one.

Interested candidates should apply to R. W. Tyler, who is in charge of the Accomplishment Tests Division. Each applicant should submit a synopsis of his training, experience, and interests, together with publications or papers which give evidence of research ability. Names of persons who are able to judge of the candidate's scholarship and research ability should also be submitted. The selection will be made about May 1.

READINGS

DAVIS, CALVIN O. "Training Secondary-School Teachers in Universities," *High School Teacher*, VI (March, 1930), pp. 109-10, 118.

An analysis of the announcements of twenty-five leading United States universities as to their offerings in the training of secondary-school teachers is depicted by Mr. Davis. He summarizes the present considerable variety in requirements and practices in these universities, pointing clearly to the need for some comparable bases and yet not so much as to stifle development. This article is worth keeping for reference.

JACOBSON, P. B., AND VAN DUSEN, E. C. "Remedial Instruction in Reading in the Ninth Grade," *School Review*, XXXVIII (February, 1930), pp. 142-46.

The experience of these investigators in studying the reading ability of high-school Freshmen duplicates every study made in this field, namely, that many students are far from satisfactory in their reading skill. Out of 150 pupils, 39 per cent were below seventh-grade ability as defined by the Iowa High School Reading Test, 19 per cent had from seventh- to eighth-grade ability, 23 per cent had from eighth- to ninth-grade ability, and 19 per cent had above ninth-grade ability.

Three major difficulties were encountered in the remedial instruction: namely, the English teachers did not know how to teach reading; suitable materials were not available; and the teachers became discouraged because the pupil's reading ability did not improve rapidly. When the pupils were tested at the end of the five months of training, there was an average gain shown of 2.1 grades. The lack of a control group made it impossible for the authors to state positively that this was due solely to the reading instruction. If English teachers believe that it is part of their task to train pupils in skillful, silent reading, they will find stimulation and enlightenment in this article.

WATT, R. R. G., AND TOUTON, FRANK C. "Relative Scholastic Achievement of Native Students and Junior College Transfers at the University of Southern California," *California Quarterly*, V (April, 1930), pp. 243-48.

With the rapid development of the junior colleges throughout the country, there is a growing need for an evaluation of the work that is being done in these institutions. In comparing the scholastic achievements of students who transfer with those of the students that have completed their preliminary work in the lower division of the University of Southern California these authors have found that the quality of work done by the junior-college graduates is approximately equivalent to that of the native students. The authors believe, however, that the training given in the preliminary years of the university still has a slight advantage over that given in the junior colleges.

Previous studies of a similar nature have been made at Stanford University, University of California, and the University of California at Los Angeles. The first of these indicate a superiority in scholarship for the junior-college transfers while the other two seemed to indicate a better record for the students that had taken their preliminary work in the universities.

THOMAS, JOHN S. "Encouraging Discussion in Teacher's Meetings," *Elementary School Journal*, XXX (February, 1930), pp. 444-49.

Mr. Thomas describes in this article the techniques which are used in the Clippert School, at Detroit, Michigan, to secure active participation of the teachers in the monthly faculty meeting. In the first place the general subjects of these meetings are planned a semester in advance, and problems are selected which intimately concern all teachers in the building. A week in advance of each monthly meeting a guide is posted or mimeographed and sent out to each teacher. This communication states the specific purpose of the meeting and presents three or four questions which are to serve as a guide to the teachers in their thinking on the subject.

The first fifteen minutes of each meeting are social in nature, and tea or refreshments are served. The large group then subdivides itself into groups of not more than seven each under the direction of a chairman. Discussion takes place in each of these smaller groups, they reconvene after twenty minutes, and the chairmen present their reports. The faculty then take whatever action on the problem that they deem wise. Experiments of this kind are to be commended. Many teachers' meetings are far too dull and fruitless.

STINGLEY, C. L. "Curriculum Practices in 95 Junior High Schools in Ohio," *High School Teacher*, VI (March, 1930), pp. 114-16.

This is a representation of a report with tables, covering time-allotments by departments, constants and variables, types of programs of study, pupil guidance, and general conclusions. Mr. Stingley commends the experimentation evidenced by the wide variation of organization, and especially that with new subjects. English is noted as the only real constant, although the ninth year is the only one with widely variable offerings.

EELLS, WALTER CROSBY, AND BRAND, R. ROMAYNE. "Student Opinion in Junior Colleges in California," *School Review*, XXXVIII (March, 1930), pp. 176-91.

The investigator made a questionnaire study of the opinions of more than three thousand students in junior colleges in California, work which represents a sampling of approximately one-third of the 8,555 students in 28 different junior colleges in California. The following significant facts were revealed.

Fifty-five per cent were men, and 45 per cent were women. Since this agrees well with the distribution as found in the entire enrollment in the state, the sampling, as far as sex is concerned, is accurate. About 80 per cent of the students stated that they live at home while attending junior college. Ninety per cent expected to go beyond the junior college in education, indicating clearly that junior-college students do not look upon this institution as the terminating point of their education.

The reasons given by these students for attending junior college are, in order of frequency, as follows: to save money, to prepare for work in university, lack of university entrance credits, to prepare for a vocation, to secure advantage of small classes, needed at home, parents thought I was not old enough to go away, part-time employment available, opportunity for social and moral training, to be with friends, greater opportunity in student activ-

ities. Interestingly enough, the reason, "to be at home," was not underlined by a single student. These answers show a high degree of reliability as far as order of importance is concerned when grouped by type of college, sex, or class.

The major disadvantages stated were, in order of frequency, as follows: academic limitations, no college atmosphere, extra-curricular limitations, environmental and cultural limitations, and limited equipment.

GUIN, RUSSELL L. "Cash and Carry On," *High School Teacher*, VI (March, 1930), pp. 99-100.

This article concerns a report of a class in English III where themes come in on time and on live subjects; also, the pupils receive pay. Accuracy, style, promptness, and reliability are developed through a novel plan.

For three years the journalism class at Westville, Illinois, has been writing for newspapers and at present is under contract with a nearby city daily. The individuals have regular beats, are responsible for them, and are paid at regular rates. All in all the plan seems to give the pupils an opportunity to vitalize their English course with benefits to all concerned.

Books to Read

BETTS, G. H., AND KENT, R. A. *Foreign Language Equipment of 2325 Doctors of Philosophy*. Bloomington, Illinois: Public School Publishing Company, 1929. 151 pp. (Northwestern University Contributions to Education, School of Education Series, No. 2)

The volume is a summary of the results of a questionnaire sent to a total of thirty-five hundred holders of the Ph.D. degree granted by American universities, the degree having been obtained in most cases in the decade 1916-26. From this total group replies were received from about two-thirds, a high return, and indicative of interest in the problem. The questionnaire covered in some detail language training, language requirements met, use of foreign languages in graduate work and since—and gave opportunities for free expression of any reaction to the problem which these individuals might have.

Perhaps the most striking features of the findings were the great variations in attitude shown by different individuals in every field, and the active nature of the problem as indicated by the replies. In no field except the languages was there anything like unanimity in the belief that the language requirements were necessary. There was quite general dissatisfaction with the way in which those requirements were now administered and much evidence that many if not most men with Doctor's degrees were not able in their professional work to make effective use of these languages. The general conclusion appears to be that the language requirement should probably be put on a par with other professional tools, and the question as to whether the requirement should be kept should be decided separately by the different subjects or perhaps individually with reference to different candidates and their different needs. As is usual in any attempt to cover faculty opinion, gross prejudice, rather frequent flippancy, antagonism toward colleges of education and toward any attempt at the systematic study of the problems of the university, all appeared.

As was well remarked, it is curious how often men trained in scientific work find it impossible to transfer that training to their view of educational issues.

S. L. PRESSEY

PAYNTER, RICHARD H., AND BLANCHARD, PHYLLIS. *A Study of Educational Achievement of Problem Children.* New York: Commonwealth Press, 1929. x + 72.

This is an analytical study of the educational achievement of more than three hundred elementary-school children referred on account of behavior difficulties to the demonstration child-guidance clinics of the National Committee for Mental Hygiene at Los Angeles and Philadelphia. Achievement was measured by the Stanford Achievement Test or the Otis Classification Test, Part I. Children having Stanford-Binet intelligence quotients below 80 were excluded from the study; also those in continuation or high schools. The groups from each city gave median Stanford-Binet intelligence quotients of approximately 100. Educational quotients and accomplishment ratios also gave means of approximately 100 in each group.

Problem children were roughly divided into two groups: those presenting personality difficulties and those showing conduct difficulties. Intelligence quotients below 100 occurred in 83 per cent of all the Los Angeles children who showed an inadequate personality make-up as compared with 47 per cent in the total group. The Philadelphia children were more evenly distributed. In both groups the different types of conduct difficulties were proportionately distributed among intelligence quotients below and above 100, although truancy and some other specific types of behavior difficulties occur more frequently among children with intelligence quotients below 100. There appears to be little certainly significant correlation between either personality or behavior difficulties and grade placement, whether calculated on the basis of actual, mental, or educational "ages," except in the case of stealing, truancy, and sex offenses which occur with significant frequency in the over-age groups.

The authors conclude, tentatively, at least, that problem children show no general tendency to slow educational achievement. "In certain pupils the failure to rise to normal levels of achievement is the result of emotional maladjustments, but it would appear that the number of these cases is smaller than one might think after reading some of the literature." The authors also state: "It is a healthy sign that so many children are considered maladjusted by teachers on other grounds than those of educational attainment and grade placement."

FRANCIS N. MAXFIELD

ROBBINS, PHYLLIS. *An Approach to Composition through Psychology.* Cambridge, Massachusetts: Harvard University Press, 1929. xvii + 271 pp. (Harvard Studies in Education, Vol. 12)

Seldom does one read a book whose title is so overshadowingly accurate as this. The writer starts with a quotation from H. A. Overstreet, "Writing is a psychological enterprise," and for nearly three hundred pages explains the statement, analyzes it, and illustrates the significance of its implications in connection with the materials and methods of composition itself and of composition teaching.

The introductory portion of the book discusses certain general principles related to the psychology of verbal composition. The necessity of the writer's knowing something about the workings of his own mind and the minds of other people, in order that imagination and reflection may follow observation, is argued convincingly. The major portion of the book is devoted to rather complete speculative illustrations of what might be done by a teacher employing what may be called an analytical-synthetic system with composition classes in the upper years of the high school.

As one reads *An Approach to Composition through Psychology*, one is apt to be reminded of Poe's *Philosophy of Composition*, in which he explains his avowed mechanical method of writing "The Raven." We know that Poe never wrote "The Raven" as he claims he did. He may have written "The Bells" in some such manner, however. It has all the earmarks of logarithmic poetry. One suspects, too, that writing produced in the psycho-analytical manner, while it might have certain dissecting-laboratory value, would have little other. The ultimate inference, therefore, scarcely need be stated.

H. F. SEELY

BECKER, MAY LAMBERTON. *Books as Windows.* New York: Frederick A. Stokes Company, 1929. xii + 289 pp.

"Books are like windows, not only to look at but look through." This explanation is given by Mrs. Becker who is author of "Readers' Guide" of the *Saturday Review of Literature*. She shares her methods of getting the most pleasure as well as profit out of reading. How to see life—past, present, and future—through books, and how to pass that information on to others is the aim. In a most interesting way, valuable reading suggestions are provided for both the individual and for literary clubs. The excellent bibliographies found at the end of each chapter give both the books referred to in the discussions and suggestions for further reading.

E. M. GRAHAM

JUDY, HELEN ELIZABETH. *Trends and Needs in Home Management.* New York: Teachers College, Columbia University, 1929. viii + 128 pp. (Teachers College, Columbia University, Contributions to Education, No. 365)

Anyone interested in the general field of home management will find some interesting information about the aims and objectives as well as the subject-matter content of such courses in the past, what is included at the present, and what is deemed desirable practice by those answering the questionnaire.

Policies or needs suggested are that the course in home management be placed in the last portion of the third year or preferably in the fourth year of college in order that sufficient time may be given to the basic materials. It is also suggested that it will be necessary to increase the scope of subjects included as prerequisites and thus eliminate materials which are essential but do not belong in a course in home management. "Home Management should integrate the social, educational, recreational, industrial, and economic aspects of family life."

ALICE M. DONNELLY

Four Books on Learning

By SAMUEL RENSHAW

THE aim of the book, *The Nature and Direction of Learning*,[1] is to "present the psychology of learning and give teaching techniques based thereon, and is intended for use just before courses in special method and practice teaching." It is a book on general methods, and the writer claims of necessity that it must be preceded by introductory courses in the materials of instruction, school organization, management, and testing of the pupil population.

Learning is defined as the acquisition of changed modes of behavior and reaction. The latter two terms the author holds involve both overt motor activity and inner mental activity. Mr. Burton distinguishes five types of learning: sensori-motor, perceptual, problem solving, memorizing, and appreciation. He presents the view that learning consists in the formation of new bonds in the Thorndikian sense, or the modification of old ones, and adheres to a set of neurological theorems which the work of Lashley, Coghill, and others has certainly effectively exploded. The author recognizes the inadequacies of this view by pointing out that such a schematized conception of learning as is presented in Thorndike's stimulus-response bond theory does not take account of the various psychological factors, such as attitudes, methods of expending practice, social pressures, and the like. Although the author admits the inadequacy of the bond theory, he decides to refrain from introducing the student to any other view on the ground that it is likely to be confusing. The problem of sensori-motor learning is disposed of in 18 pages. No new note is struck by the writer in his treatment of the following topics: setting the model, best methods, whole versus part, demonstration versus verbal directions, imitation, trial and success, criticism, and drill. In other short chapters problem solving, the Herbartian formal steps, the project method, the acquisition of emotional responses, effective drill or practice, supervised study, using the laboratory, books, questioning, examining, testing, marking, and diagnosis receive attention. The finale is a chapter on lesson planning.

The general plan of the book is of interest because it is somewhat unusual. Each chapter or general division is sub-

[1] Burton, William H. *The Nature and Direction of Learning*. New York: D. Appleton and Company, 1929. xviii + 595 pp.

divided into a number of problems stated in the form of a question. This is followed in turn by a set of exploratory and pretest questions which the reader is to try out upon himself and to answer as best he can in the light of his present information. Following this Mr. Burton presents his own discussion of the issue and closes with a group of questions, observation exercises, and parallel readings from books on the same general questions.

The reviewer believes that this volume stands out among the best of similar treatises intended for beginners in teacher training. However, in many places the content of the book seems to be drawn from second-hand and, to say the least, antiquated sources, particularly upon the fundamental problem of learning. For this there can be no excuse. The training of teachers can advance only very slowly when, for instance, the beginner is taught that the best "explanation" of the fundamental basis of learning is to be found in the principle of neurobiotaxis. This book possesses the same fault that many other similar works have: for example, a series of rules or admonitions on memorizing are: (1) Examine the material to be memorized for thought content first; (2) make the first study with unusual care; (3) distribute the practice repetitions over a period of time; (4) attention and interest must be maintained during repetition; (5) learn under some pressure; (6) the method of correct recall should be used; (7) use the whole instead of the part method (pp. 195-99). All of this is undoubtedly good advice, but certainly it would seem safer in treating No. 7 to refer to the work of Pechstein and others who have shown that the statement of No. 7 is not unqualifiedly true for all types of learning and for all types of learners.

From a typographical and pedagogical point of view the book is admirable. The author's style is simple, clear, and direct. There are 595 pages and an excellent index.

THE author of *Progressive Practices in Directing Learning* promises in his Preface that the book is written "for the specific purpose of giving definite help to the classroom teacher by bridging the gap between general principles and their practical application." Here is a sample of how the promise is fulfilled:

> The differences in the final achievement of pupils are due to differences in their progress of learning. Some pupils learn rapidly, others slowly, but

the ability to learn is present in every normal child. A pupil stumbles along or learns economically according as his learning activities are skillfully directed toward the learning products. Setting up new ways of behavior as learning products and providing learning activities that will produce new ways of behaving are not sufficient. The learning activities of each pupil must be directed toward attainment of the ways of behaving.[2]

There are chapters on recognizing individual differences, individualizing the learning activities, focusing the attention of the pupil, increasing the ease of learning, visual aids, testing, diagnosing the pupil's difficulties, and methods of delineating progress. The book is intended for students in teacher-training classes.

The writer of the third book on learning, a nurse, prescribes for patients whose complaint is: "If I only knew how to study!" Miss Muse's prescription in her book, *Introduction to Efficient Study Habits, According to the Laws and Principles Governing Economical Learning*, is Professor Thorndike's elixirs of exercise and effect.[3]

IN THE Preface of the book, *Conflicting Psychologies of Learning*,[4] the author, a leading and widely known educational philosopher, makes the following assertions: "In spite of the fact that psychology prides itself on being a science, its deepest problems are of a kind that cannot be solved by the application of scientific technique. These problems are problems of interpretation, and they all trace back to the fundamental problem of the nature of mind." Also we read that "psychology at present is a scene of confusion and violent disagreement. There is a steadily mounting mass of data, but we do not know what they mean." This is the theme which Mr. Bode dilates upon in the subsequent portions of his book. The reader is left with the impression that the psychologists attacking the problem of learning are largely engaged in a stupendous family quarrel, for the most part missing the chief point, namely, that the problem of learning is eventually reduced to the business of gaining some clear-cut and comprehensive notion of the nature of mind.

[2] Palmer, A. R. *Progressive Practices in Directing Learning.* New York: Macmillan Company, 1929. pp. 2-3.

[3] Muse, Maude Blanche. *Introduction to Efficient Study Habits, According to the Laws and Principles Governing Economical Learning.* Philadelphia: W. B. Saunders, 1929. 110 pp.

[4] Bode, B. H. *Conflicting Psychologies of Learning.* New York: D. C. Heath and Company, 1929. 305 pp.

The central theme of this book "is the nature of mind, which is an interpretative problem," and hence beyond the reach of scientific method. Learning is thus a problem surely, but it is a problem incidental to the nature of mind, and its most likely solution will be found in the interpretative labors of the philosopher.

It is interesting to note that Mr. Bode develops his theme by devoting one hundred eight of his three hundred pages to the various historical doctrines of the mind-body problem and to the nature of consciousness. Sixty-five more pages are then given to the rise of physiological psychology and to an exposition of behaviorism. References are almost entirely limited here to the writings of Watson, Weiss, and Thorndike. Purposive behavior and the stimulus-response doctrine are treated at some length and are considered in the light of the various traditional psychological points of view—all of which takes two hundred fifty of the three hundred pages and prepares the reader for the analysis of the nature of meaning and the author's exposition of his own point of view, a variant of the pragmatism of James and Dewey.

Students of education will find the book stimulating and profitable. Psychologists will miss an interpretative review of the recent large literature on learning, both experimental and theoretical, by so able a critic as the author. They may even feel that Mr. Bode does them some injustice in failing to point out that learning as a psychological problem is barely two decades old. The author's style and his clever witticisms make the book extremely interesting reading.

In the opinion of the reviewer the volume is a good contribution to the educational literature, for it assuredly brings the problem of learning clearly to issue, and regardless of the reader's disposition to agree with Mr. Bode's treatment of the problem, he cannot remain coldly neutral to the issues raised by the author.